

In the Claims:

Amend claims 1, 19, 34 - 36, and 38, cancel claims 2, 33, 37, 40 and 41 without prejudice, and add new claims 42 - 48 as follows:

1 (presently amended). A device for producing a ~~control~~ signal ~~to control~~ for controlling an apparatus ~~based on the movement of~~ by moving a reflecting surface, comprising:

a light source for illuminating the moving reflecting surface;

a sensor for receiving from the moving reflecting surface a corresponding moving pattern of light ~~that has been caused to move by movement of the reflecting surface and~~ producing a sensor electrical signal related to the movement of said pattern, said sensor comprising a photo-emf material having a plurality of electrodes disposed thereon for detecting electrical current caused by differential emf generated by the motion of said pattern received by said sensor; and

an interface circuit for producing from said sensor electrical signal said control signal to control an the apparatus.

2 (cancelled).

3 (originally presented). The device of claim 2, wherein said plurality of electrodes comprises a first set of electrodes arranged so as to define a first direction normal thereto, and a second set of electrodes arranged so as to define a second direction normal thereto, said first direction and said second direction being askew to one another.

4 (originally presented). The device of claim 3, wherein said plurality of electrodes comprises a plurality of interdigitated electrode pairs having gaps between adjacent electrodes, the material between every other said gap being having a reduced photo-emf property.

5 (originally presented). The device of claim 3, wherein said plurality of electrodes comprises a plurality of interdigitated electrode pairs having gaps between adjacent electrodes, said sensor further comprising a mask disposed over said plurality of electrodes so as to block light from illuminating alternate said gaps.

6 (originally presented). The device of claim 2, wherein said plurality of electrodes comprises a plurality of groups of electrodes arranged in different respective spatial orientations.

7 (originally presented). The device of claim 6, wherein said groups of electrodes comprise pluralities of interdigitated electrode pairs having gaps between adjacent electrodes, alternate gaps producing no photo-emf effect.

8 (originally presented). The device of claim 6, wherein said groups of electrodes are arranged in a rotationally-symmetric pattern, and the optical axis of said light source is coincident with the axis of rotational symmetry of said pattern.

9 (originally presented). The device of claim 6, wherein each said group of electrodes defines a maximum emf-sensitivity-vector, said sensitivity vectors forming a cross.

10 (originally presented). The device of claim 6, wherein each said group of electrodes defines a maximum emf-sensitivity-vector, said sensitivity vectors forming a loop.

11 (originally presented). The device of claim 6, wherein each said group of electrodes defines a maximum emf-sensitivity-vector, said sensitivity vectors forming a plurality of radial spokes.

12 (originally presented). The device of claim 6, wherein each said group of electrodes defines a maximum emf-sensitivity-vector, said sensitivity vectors forming a plurality of radial spokes and concentric arcs.

13 (originally presented). The device of claim 6, wherein said electrodes form concentric arcs.

14 (originally presented). The device of claim 6, wherein said electrodes form a substantially planar spiral.

15 (originally presented). The device of claim 2, wherein said photo-emf material comprises doped gallium arsenide.

16 (originally presented). The device of claim 15, wherein said electrodes comprise gold:germanium alloy.

17 (originally presented). The device of claim 1, wherein said light source comprises a coherent light source.

18 (originally presented). The device of claim 17, wherein said coherent light source comprises a laser.

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19 (presently amended). The device of claim 17, wherein said ~~light~~ coherent light source produces linearly polarized light.

20 (originally presented). The device of claim 19, wherein light reflected from said reflecting surface to said sensor is filtered to irradiate said sensor only with linearly polarized light.

21 (originally presented). The device of claim 18, wherein said device further comprises a laser controller for controlling the power to said laser based on the light detected by said sensor.

22 (originally presented). The device of claim 1, further comprising optics for directing light from said light source to the reflecting surface, thereby producing an irradiating pattern of desired size and shape on the reflecting surface.

23 (originally presented). The device of claim 1, further comprising optics for directing light from the reflecting surface to said sensor.

24 (originally presented). The device of claim 1, wherein said interface circuit comprises electrical signal-conditioning circuitry for amplifying, filtering, and scaling said sensor signal, as needed.

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25 (originally presented). The device of claim 24, wherein said interface circuit further comprises a conversion circuit for receiving said sensor signal following any needed amplification, filtering and scaling, and producing said control signal in a format acceptable by the apparatus to be controlled.

26 (originally presented). The device of claim 1, wherein said interface circuit comprises means for decomposing said sensor signal into signals representative of translation of the reflecting surface and rotation of the reflecting surface, respectively.

27 (originally presented). The device of claim 1, wherein said interface circuit comprises means for decomposing said sensor signal into command signals related to predetermined motions of the reflecting surface.

28 (originally presented). The device of claim 1, wherein said interface circuit comprises means for detecting a signal condition for activating or deactivating continuance of a control signal representative of a current motion.

29 (originally presented). The device of claim 1, wherein the apparatus to be controlled is a digital computer.

30 (originally presented). The device of claim 1, wherein the apparatus to be controlled is a display device for representing a three-dimensional image, wherein sensor signals resulting from translation of the reflecting surface produce translation of an image produced by said display device, and sensor signals resulting from rotation of said reflecting surface produce rotation of said image produced by said display device.

31 (originally presented). The device of claim 1, wherein the apparatus to be controlled is a robotic device wherein sensor signals resulting from translation and rotation of said reflecting surface produce corresponding motion of said robotic device.

32 (originally presented). The device of claim 1, wherein said device to be controlled is a virtual reality device wherein sensor signals resulting from motion of said reflecting surface produce predetermined responses in virtual space.

33 (cancelled).

34 (presently amended). A device for producing a ~~control~~ signal ~~to control~~ for controlling
an apparatus by moving the device over a diffusely reflecting surface, comprising:

a case;

a support member for movably supporting said case on a the surface;

a coherent light source disposed within said case for illuminating ~~said~~ the surface ~~on~~
~~which said case is supported~~;

a sensor disposed within said case for receiving from said surface, by moving said case
thereover, a corresponding moving speckle from said surface a pattern of light and
producing a sensor electrical signal related to said movement of said pattern for
controlling the apparatus; and

~~an interface circuit for producing from said sensor electrical signal said control signal to~~
~~control an apparatus.~~

35 (presently amended). A device for producing a ~~control~~ signal ~~to control~~ for controlling
an apparatus, comprising:

a case for movably supporting a ball for rotation;

a coherent light source for illuminating ~~the~~ a surface of said ball;

a sensor for receiving from said surface, by rotating ~~of~~ said ball, a corresponding moving speckle pattern of light that has been caused to move by rotation of said ball and producing a sensor electrical signal related to said movement of said pattern for controlling the apparatus; and

~~an interface circuit for producing from said sensor electrical signal said control signal to control an apparatus.~~

36 (newly amended). A human-machine interface method for controlling an apparatus ~~based on~~

Adapt ~~the movement of~~ by moving a hand ~~reflecting surface~~, comprising:

moving the hand while illuminating the surface of the ~~reflecting surface~~ hand;

receiving from ~~the reflecting~~ the surface of the hand a pattern of light that has been caused to move by movement of the ~~reflecting surface~~ and a corresponding changing distribution of irradiance;

producing a sensor electrical signal related to said ~~movement~~ changing distribution of irradiance for controlling an apparatus; and

~~producing from said sensor electrical signal said control signal to control an the~~
~~apparatus.~~

37 (cancelled).

38 (newly amended). The method of claim ~~37~~ 42, wherein said coherent light is linearly polarized.

39 (originally presented). The method of claim 38 wherein light from said reflecting surface is filtered to receive only linearly polarized light.

40 (cancelled).

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41 (cancelled).

42 (new). The method of claim 36, further comprising providing coherent light for said step of illuminating, so that said changing distribution of irradiance is a moving speckle pattern.

43 (new). The method of claim 36, further comprising producing from said sensor electrical signal a control signal for controlling the apparatus.

44 (new). The device of claim 35, further comprising an interface circuit for producing from said sensor electrical signal a control signal for controlling the apparatus.

45 (new). The device of claim 34, further comprising an interface circuit for producing from said sensor electrical signal a control signal for controlling the apparatus.

46 (new). A device for producing a ~~control~~ signal ~~to control~~ for controlling an apparatus by moving a reflecting surface, comprising:

a light source for illuminating the moving reflecting surface;

a sensor for receiving from the moving reflecting surface a corresponding changing distribution of irradiance and producing a sensor electrical signal responsive thereto; and

Cont an interface circuit for producing from said sensor electrical signal said control signal to control the apparatus.

47 (new). The device of claim 48, wherein the surface is diffusely reflecting, an wherein said light source comprises a coherent light source, so that said changing distribution of irradiance is a moving speckle pattern.

48 (new). A method for controlling an apparatus by moving a reflecting surface, comprising:

illuminating the moving reflecting surface;

receiving from the moving reflecting surface a corresponding changing
distribution of irradiance;

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producing a sensor electrical signal responsive to said changing
distribution of irradiance for controlling the apparatus.
